

CLAIMS

1. Gearbox 'device' (100, 200) comprising rotating components (1, 2, 4, 5, 15) holding toothed components (E1-E7, S12, S34, S5, S57, S6, S7, D1-D4, 5 D7, DC, FC, F6, FR, ST, SB), characterized in that at least one counter gear (ST, E2, E3, E4) of the toothed components, which serves to transmit movement between two rotating components in order to produce a gear ratio, can be selectively coupled with another rotating component in order to produce another gear ratio.
- 10 2. Device according to claim 1, characterized in that the counter gear (ST) is held by a rotating output component (4) to which it can be coupled in order to produce said other gear ratio.
3. Device according to claim 1 or 2, characterized in that the counter gear (E2, E3, E4) is held by a rotating input component to which it can be coupled 15 in order to produce said other gear ratio.
4. Device according to one of claims 1 to 3, characterized in that at least one counter gear (ST) serves to transmit the movement between a rotating input component (1, 2) and an intermediate rotating component (5).
5. Device according to one of claims 1 to 4, characterized in that at least 20 one counter gear (E2, E4) serves to transmit the movement between an intermediate rotating component (15) and a rotating output component (4).
6. Device according to one of claims 1 to 5, characterized in that, in its transmission function, the counter gear is uncoupled from the rotating component that holds it.
- 25 7. Device according to one of claims 1 to 6, characterized in that at least one counter gear (ST), which for one gear ratio causes a direction of rotation of a rotating output component (4), also has, for another gear ratio, a reverse gear function for the direction of rotation of said rotating output component.

8. Device according to one of claims 1 to 7, characterized in that the at least one counter gear comprises a cluster gear (ST) having two sets of teeth (S5, TC) each engagement with a set of teeth connected to one of said rotating components between which it transmits the movement.

5 9. Device according to one of claims 1 to 8, characterized in that the counter gear (ST) and several other toothed output components (S12 – S34) are mounted on a rotating output component (4) and each engage with a respective toothed input component (E1-E4) mounted on at least one rotating input component (1, 2), and with a respective intermediate toothed component 10 (DC, D1-D4) mounted on an intermediate rotating component (5), coupling means (C13, C6, C24) being provided in order to carry out the transmission from the at least one rotating input component (1, 2) to the rotating output component (4), directly or selectively via the counter gear (ST) and the intermediate rotating component (5).

15 10. Device according to one of claims 1 to 9, characterized in that at least one of the toothed components (E3) that can be selectively coupled with another rotating component (1) in order to produce a gear ratio is a transfer component that has a proportional transfer function for the gear ratios to a rotating transfer component (10) serving to transmit the movement to at least 20 one wheel shaft.

11. Device according to claim 10, characterized in that one of the toothed input components (E3) belongs to the at least one counter gear and can either be coupled with the at least one rotating input component in order to produce a direct ratio between the rotating input component (1) and the rotating 25 transfer component (10), or be uncoupled in order to transmit the movement of the rotating output component (4) to the rotating transfer component (10).

12. Device according to claim 5, characterized in that one of the toothed input components (E2, E4) belongs to the at least one counter gear and can either be coupled with the at least one rotating input component (2) in order to 30 produce a direct ratio between the rotating input component (2) and the

rotating output component (4), or be uncoupled in order to transmit the movement between an intermediate rotating component (15) and the rotating output component (4).

13. Device according to claim 12, characterized in that the rotating input  
5 component (1) and the rotating intermediate component (15) are connected  
by another pair of sets of teeth (E6-FC), engaged with each other.

14. Device according to claim 12 or 13, characterized in that there is direct  
engagement between a toothed component (FR) on an intermediate rotating  
component (15) and a toothed component (TC) on the rotating output  
10 component (4) for a reverse ratio.

15. Device according to claim 9, characterized in that the at least one  
counter gear comprises a second counter gear (E2, E4) mounted on a rotating  
input component (1) between a toothed output component (4) and a toothed  
intermediate component (F6, FR) mounted on a second intermediate rotating  
15 component (15) holding at least one common toothed component (DC)  
engaging with a toothed input component (E6).

16. Device according to one of claims 9 to 15, characterized in that the at  
least one rotating input component comprises two rotating input components  
(1, 2) that can be alternatively and selectively coupled with a drive shaft (3),  
20 one of the rotating input components (2, 1) driving the counter gear (ST) held  
by the rotating output component (4), the other (1, 2) holding toothed input  
components (E1, E3, E2, E4) that define ratios that alternate with those  
defined via the intermediate toothed components (D2, D4, D1, D3).

17. Device according to one of claims 1 to 15, characterized in that the at  
25 least one rotating input component comprises two rotating input components  
(1, 2) that can be selectively engaged with the same engine, the shift from one  
gear ratio to a neighbouring gear ratio comprising an action of engaging at  
least one of the rotating input components (1, 2) and disengaging the other  
rotating input component.

18. Device according to claim 16 or 17, characterized in that the rotating input components (1, 2) are coaxial.
19. Device according to one of claims 16 to 18, characterized in that a rotating input component comprises only one toothed component (E5, E6) engaging with the at least one counter gear (ST).  
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20. Device according to one of claims 1 to 19, characterized in that it comprises a single rotating output component (4).
21. Device according to claim 1, characterized in that it comprises:
  - two direct ratios each produced by direct engagement of a first toothed input component (E2, E4) with a toothed output component (S2, S4).  
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  - two first indirect ratios produced by a series of engagements passing through a first counter gear (ST) held by the rotating output component (4),
  - two second indirect ratios produced by a series of engagements passing through at least a second counter gear held by a rotating input component (E4, E2), and,  
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  - a ratio (E5-S5) produced by direct engagement between the first rotating input component (1) and the first counter gear (ST) coupled with the rotating output component (4).
- 20 22. Device according to claim 21, characterized in that it comprises an additional ratio (E7-S7) produced by direct engagement between a rotating input component (1) and the rotating output component (4), with the same coupler (C57) as the one used to couple the first counter gear (ST) with the output component (4).
- 25 23. Device according to claim 21 or 22, characterized in that it comprises two intermediate rotating components (5, 15) and in that it comprises a double coupler (C24) on the at least one rotating input component (1, 2), a double coupler (C57) on the rotating output component (4) and a double coupler (C6R, C13) on each of the intermediate rotating components (5, 15).

24. Device according to one of claims 21 to 23, characterized in that it comprises two concentric input components (1, 2), one of them (2) engaging with the first intermediate rotating component (15) and holding the first two toothed components (E2, E4), the other engaging with the second counter gear (ST) and preferably engaging via another pair of sets of teeth (E7, S7) with the rotating output component (4).

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25. Use of a device according to one of the previous claims for the gearbox of a vehicle with at least two powered axles.